PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	22.11.2004
Applicant's or agent's file reference: GB/13452.8	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA 03/00926	18.06.2003	10.07.2002

Applicant: TURBOCOR INC. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Hödl, S Tel. +49 89 2399-6074

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference GB/13452.8	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/CA 03/00926	International filing date *(day/month/year)* 18.06.2003	Priority date *(day/month/year)* 10.07.2002
International Patent Classification (IPC) or both national classification and IPC F16C39/06		
Applicant TURBOCOR INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
20.11.2003	22.11.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer De Jongh, C Telephone No. +49 89 2399-8667

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA 03/00926

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-11 as originally filed

Claims, Numbers

1-33 as originally filed

Drawings, Sheets

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	8,9,13,14,28,29,31,32
	No:	Claims	1-7,10-12,15-27,30, 33
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-33
Industrial applicability (IA)	Yes:	Claims	1-33
	No:	Claims	

2. Citations and explanations

   see separate sheet

Independent claims 1 and 20

1. The present application does not satisfy the criterion set forth in Article 33(2) PCT because the subject-matter of claims 1 and 20 is not new in respect of prior art as defined in the regulations (Rule 64(1)-(3) PCT).

2. Before discussing novelty, it is noted that the application does not meet the requirements of Article 6 PCT because claims 1 and 20 are not clear and not supported by the description.
   a) Claims 1 and 20 require that the **first** gap is "**on the rotation axis**". In all examples, however, the magnet and thus the **second** gap is provided on the rotation axis. The first gap is **not** located on the rotation axis. Claim 1 is not supported by the description.
   b) Claims 1 and 20 require that the second gap is provided between the magnet and the rotor, ie. the magnet is fixed to the stator. However in the embodiment depicted in figure 2 the sole magnet is provided on the rotor (cf. also claim 4). Accordingly the embodiment of figure 2 does not fall within the scope of claims 1 and 20. Further claims 1 and 4 respectively claims 20 and 24 contradict eachother.
   c) Claims 10 and 21 are not clear, the use of non-magnetic material for the rotor and stator only makes sense when there are provided magnets both on the stator and rotor as depicted in figures 3 and 4. Furthermore, the selection of non-magnetic material in claims 10 and 21 contradicts the subject-matter of claims 1 and 20 which require that the flux path is closed via the first gap (see e.g. figure 1). A non-magnetic material would namely not guide the flux across the first gap as a soft magnetic material would do.

3. It is evident from the above that the scope of claim 1 is not clear because doubt is cast on three technical features thereof. Taking the above in account, each of the following documents are considered to deprive the subject-matter of claim 1 respectively claim 20 of its novelty.

4. Document US 4 167 295 A (**D1**) discloses (cf. column 3, lines 38 to 56 and figure 2) a thrust load enhancement device for a rotor-bearing system as defined in claim 1, ie. comprising:
   - a stator (84) mounted on a rotation axis of the rotor-bearing system
   - a rotor (60) separated from said stator by a first air gap (between walls 80 and 90); and

- a permanent magnet (92) fixed to said stator (60) and separated from said rotor by a second air gap,

whereby a flux in said first and second air gaps generates a compensation force between said rotor and said stator that opposes a gas pressure of the turbomachine.

5. Document US 6 191 515 B (**D2**) discloses a device in accordance with claim 1 whereby the permanent magnet is mounted on the rotor.

6. Document GB 2 335 242 A (**D3**) discloses a device in accordance with claim 1 (cf. in particular figure 2) whereby magnets are fixed both to the stator and the rotor. These magnets are either arranged repulsing (cf. figures 1 to 3) or attracting (cf. figures 4 to 6).

7. Another example of two attracting permanent magnets can be found in document DE 195 00 935 A (**D4**).

8. Documents GB 1 163 632 A (**D5**) and WO 98 31 947 A (**D6**) disclose further examples of mutually repulsive magnets.

9. Document EP 0 266 991 A (**D7**) discloses another example of a device in accordance with claim 1 whereby a permanent magnet (9) is fixed to the stator.

Dependent claims 2 to 19 and 21 to 33

10. Dependent claims 2 to 19 and 21 to 33 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, are new or involve an inventive step for the following reasons:
    - For the additional features of claims 2 to 7 and 23 to 27 reference is made to the above points 4 to 9.
    - The provision of a spacer to adjust the height of the gap (cf. claims 8 and 28) is known from document US 5 710 470 A (**D8**).
    - The provision of a piezoelectric actuator to adjust the height of a magnet bearing gap (cf. claims 9 and 29) is known from US 5 360 470 A (**D9**).
    - The additional features of claims 10, 11, 21 and 22 are known from each of documents **D1** to **D5**.
    - The features of claims 12, 16, 17, 18 and 30 relate to the use of the device, but do not further characterise the device itself. Furthermore, also in

documents **D1** to **D7** the permanent magnets serve either to counteract the weight, ie. a static load, of the rotor or an external (dynamic) load acting on the rotor (e.g. document **D1**).

- The use of a force sensor, in particular a piezoelectric unit (cf. claims 13, 14, 31 and 32), to control a magnetic bearing is known from US 5 291 975 A (**D10**).
- The additional features of claim 15 are known from documents **D1** to **D8**.
- A vertical configuration (cf. claims 2, 16, 17 and 18) is known from documents **D2**, **D5** and **D7**.
- The combination (cf. claims 19 and 33) with a further magnetic bearing system is known from documents **D2** and **D3.**
- The combination with a hydrodynamic bearing system is known from document **D1**.
- The combination with a rolling element bearing system is known from documents **D4, D6** and **D7**.